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THE BRYOLOGIST

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THE MOSSES OF THE LAKE GEORGE FLORA

STEWART H. BURNHAM

The region covered by this flora includes the counties of Washington, Warren, and Saratoga. A few additional records in the county of Essex at Ticonderoga and Crown Point; and in Hamilton county, at Blue Mountain Lake, are also given. I collected my first mosses about 1892; these were determined in January, 1893, by Prof. John M. Holzinger, and my interest in the Musci was awakened.

Many specimens have been determined by Mrs. E. G. Britton; Prof. J. M. Holzinger; Mr. George B. Kaiser; and Miss Edith Warner. The Sphagna have been determined by Dr. A. L. Andrews; and by Dr. Carl Warnstorf, May 13, 1902 and April, 1903. Specimens determined by Mr. Kaiser are preserved in the moss herbarium of the Sullivant Moss Society. No attempt has been made to work over the ample collections made in West Fort Ann during 1918.

Many other botanists have collected in this region, especially about Lake George. Mrs. E. G. Britton (née Miss E. G. Knight), collected a few mosses at Blue Mountain Lake in July, 1881; also a few mosses at Ticonderoga and Crown Point in 1900 and 1901: these are preserved in the Herbarium of the New York Botanical Garden and the Columbia Herbarium. Hon. George W. Clinton collected mosses at Luzerne and Saratoga Springs,—these are recorded in New York State Cabinet Report 20, 1867, and are partly preserved in the New York State Herbarium at Albany. Mr. Frank Dobbin, since 1904, has collected many mosses near Shushan.

Mr. Wallace Greenalch, during 1900 and 1901, collected mosses near Schuylerville. Mr. Greenalch wrote me April 19, 1902, that, "most of the mosses listed in THE BRYOLOGIST for July, 1900, as collected by me 'in and near Schuylerville, N. Y.' were collected not only at Schuylerville, but in different parts of New York State, namely: Indian Lake, Hamilton Co.; Ithaca; Watkins; Portage and Pattersonville; but all were erroneously credited to Schuylerville. I have collected mosses but little about Schuylerville and have kept no list of the more common mosses." Among the mosses listed in THE BRYOLOGIST for July, 1900:

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"*Anacamptodon splachnoides* Brid., *Hypnum rusciforme* Weis., *Dichelyma falcatum* Myrin," were collected at Indian Lake; "*Thelia asperella* Sulliv." at Hoffmans; "*Anomodon obtusifolius* B. & S." at Portage; "*Hypnum serrulatum* Hedw., *Gymnostomum curvirostrum* Hedw., *Fissidens taxifolius* Hedw." at Pattersonville; "*Hypnum hispidulum* Brid." at Ithaca. "*Pylaisia velutina* B. & S., *Hypnum cupressiforme* L., *Mnium marginatum* (Dicks.) Beauv., *M. orthorhynchium* B. & S., *Fissidens incurvus* Schwaegr., *Leptotrichum glaucescens* Hampe, *Dicranum fulvum* Hook., *Encalypta ciliata* Hedw.," are probably mostly erroneously credited to Schuylerville. Some of Mr. Greenalch's specimens are preserved in the Herbarium of the New York Botanical Garden.

Dr. Elliot C. Howe collected many mosses at Fort Edward and in Moreau from 1864–1868. Many of these were sent to Mr. Coe Finch Austin and are now preserved in the Columbia Herbarium. The Dr. Howe herbarium, which contained many mosses, was purchased by the New York Botanical Garden in 1902. Several of Dr. Howe's specimens are found in the New York State Herbarium. Dr. Geo. D. Hulst collected at Lake George, in the vicinity of Assembly Point in 1898–1899; specimens are preserved in the Herbarium of the New York Botanical Garden. Dr. Smith Ely Jelliffe collected many mosses about Huletts Landing in 1888 and 1889; these are preserved in his herbarium in New York City and a few in the Columbia Herbarium.

Mr. Leo Lesquereux, "freely communicated the names, habitat, etc., of numerous species collected by him on the Adirondack Mountains," . . . about Lake George, in the List of Mosses of the State of New York written by Charles H. Peck in New York State Cabinet Report 19, 1866. These were probably preserved in the Lesquereux herbarium. Miss Daisy J. Levy in THE BRYOLOGIST for May, 1919, publishes a "Preliminary List of Mosses Collected in the Neighborhood of Huletts Landing, Lake George, N. Y.," during the months of July–August, 1917. These specimens I have not examined. Dr. Chas. H. Peck collected a few mosses in the territory which are preserved in the New York State Herbarium.

In Geology of New York, Vol. 1, Part 1, Geology of the First Geological District, Albany, 1843, Mr. William W. Mather discusses peat. On page 12 and, on page 14, are Tables of the Localities of Peat and Marl in Washington County, with number of acres. No peat localities for Saratoga County are given. In Geology of New York, Vol. 2, Part 2, Geology of the Second Geological District, Albany, 1842, Dr. Ebenezer Emmons on pages 185–186 discusses peat and the towns are mentioned where it has been found in Warren County. It states "the depth of one of the beds of peat in Warrensburgh exceeds sixty feet, and must have been forming for seven or eight hundred years."

Peat has been cut from the marshes along the inlet stream of Glen Lake, and this fact has been stated by Dr. A. W. Holden in his History of the Town of Queensbury: 146. 1874. "There are two or three extensive peat beds in this neighborhood, one of which, at the head of an estuary stretching westwardly from Long Pond (Glen Lake) has been extensively worked during the past few years by the Corning Iron Company of Albany." Dr. Heinrich Ries has a paper on "Uses of Peat and its Occurrence in New York" in the 21st Report of the State Geologist for 1901 (reprinted from the N. Y. State Mus. Rep. 55: r53–r90. 1903). He gives on pages r83–r84 several localities for peat in Washington and Warren counties. The paper also records that, "Mr. F. W. Wait, of Glen Falls, states that some 20 years ago the Albany Peat Works established a plant, and operated it for some years in the swamp between Glens Falls and French Mountain, on the road leading to Lake George. Work was abandoned after a time, however.

"About 10 years before this, Judge E. H. Rosecrans produced peat from what is known as Rosecrans swamp, northeast of Glens Falls, but this likewise was discontinued."

During the recent World War, sphagnum was used to a vast extent in the place of absorbent cotton in surgical dressings and was superior to the cotton. Mr. Geo. E. Nichols in THE BRYOLOGIST for July, 1918, states that in eastern United States, *Sphagnum papillosum* was regarded the best species; *S. palustre*, next; also useful, *S. imbricatum* and *S. magellanicum*, "where these appear sufficiently luxuriant."

Mr. William W. Mather in Geology of New York, page 81, speaks of Calcareous Tufa occurring "near Whitehall, as a deposit from springs" and in Saratoga county, "on the banks of the Hudson between Glens and Bakers falls. The most beautiful incrusted moss was obtained from this locality. It is said to abound at Saratoga." Calcareous tufa in this region is formed by water, carrying bicarbonate of lime in solution, trickling over cushions of *Gymnostomum* and *Cratoneuron filicinum*. The mosses become completely incrusted below, but go on growing at the apex of the stem, as the older parts of the plants die. Specimens of tufa formed on *Cratoneuron filicinum* was collected along the banks of Pond Brook, east of W. Fort Ann P. O., October 31, 1914.

An attempt, in the list of species, is made to mention the northernmost station first. The following abbreviations are used:

CH, Columbia Herbarium.
GH, N. Y. Botanical Garden Herbarium.
JH, Jelliffe Herbarium.
SH, N. Y. State Herbarium.

LIST OF SPECIES

1. *Sphagnum magellanicum* Brid. This is apparently not an uncommon species, particularly in upland cold bogs and about mountain ponds. Determined by Dr. A. L. Andrews, who says "some of the specimens" from W. Fort Ann "of this species are decidedly in the direction of what Warnstorf calls *S. subbicolor.*" Dr. C. Warnstorf in 1902 referred several specimens to *Sphagnum subbicolor* Hampe= *Sph. centrale* C. Jens.= *Sph. intermedium* Russ.; several other plants in the same sending he referred to *Sphagnum medium* Limpr. and a few plants to *Sphagnum medium*, var *laeve*, forma *purpurascens* (Russ.) Warnst.

2. *Sphagnum papillosum* Lindb. The var. *intermedium* (Russ.) Warnst. Bog north of Clarks Pond, west of Shushan. Determined by Dr. Andrews.
3. *Sphagnum palustre* L. Apparently not an uncommon species about mountain ponds and small bogs. Determined by Dr. Andrews, who says "the most practical means of distinction between *S. palustre* and *S. magellanicum* lies in the tendency of the latter to a really red pigmentation, while the other is brown." Many specimens determined by Dr. Warnstorf as *S. cymbifolium* Ehrh.

   Sphagnum cymbifolium, var. *subcarneum* Warnst. Three Ponds; Sly Pond; New Michigan Pond, "Talman marsh." Determined by Dr. Warnstorf.

   Sphagnum cymbifolium, var. *virescens* Warnst. Rosecrans swamp, north of Glens Falls. Determined by Dr. Warnstorf.
4. *Sphagnum imbricatum* Hornsch. Shushan (F. Dobbin) Determined by Dr. Andrews.

   Sphagnum imbricatum, var. *affine* (R. & C.) Warnst. Fort Ann mountains and southern W. Fort Ann. Determined by Dr. Warnstorf. Marsh west of stone schoolhouse, north of Tripoli; low woods north of Cambridge. Determined by Dr. Andrews.
5. *Sphagnum compactum* DC. Wet places on rocks, Curtis hill, east of Fort Ann, August 29, 1896. Dr. Warnstorf called the specimens at first *S. compactum:* but in April, 1903, he renamed the specimens *Sphagnum Garberi* L. & J., which is a synonym of *Sphagnum strictum* Sull.

   Sphagnum compactum, var. *squarrosum* Russ. Wet place, summit of Sugar Loaf Mt., Dec. 3, 1900. Determined by Dr. Warnstorf. Plants from the same station, Nov. 13, 1915, were determined by Dr. Andrews as *S. compactum.*
6. *Sphagnum Wulfianum* Girg. "Knolls and slight elevations in sphagnous swamps. Moreau." (E. C. Howe). "A species easily recognized by its rigid red stems and numerous short branches, those of the summit of the stem being crowded into a dense subglobose head." N. Y. State Cab. Rep. 22: 56. 1869. In (CH), Dr. Howe's specimens are labelled Fort Edward. Marsh west of stone schoolhouse. Determined by Dr. Andrews. Rich's swamp southwest of Shushan.

   Sphagnum Wulfianum, var. *viride* Warnst. Swamp woods south of Mud Pond, Pattens Mills. Determined by Dr. Warnstorf. This station is probably destroyed.
7. *Sphagnum squarrosum* Crome. This beautiful easily recognizable species is frequently met with in bogs and old swampy woods. Dr. Warnstorf determined several collections as *Sphagnum squarrosum*, var. *spectabile* Russ. to which variety probably most of our plants are referable.

   Sphagnum squarrosum, var. *semisquarrosum* Russ. Northeast of Fort Ann; east of Thompsons gravel-bed, southern W. Fort Ann. Determined by Dr. Warnstorf.

8. *Sphagnum teres* (Schimp.) Ångstr. Inman Pond, Bear Pond; French Mt.; Five Combine woods, east of Hudson Falls. Determined by Dr. Warnstorf. East Lake George marsh at Brayton; bog north of Clarks Pond. Determined by Dr. Andrews.

    Sphagnum teres, var. *squarrosulum* (Lesq.) Warnst. Black Mt.; E. Lake George marsh. Determined by Dr. Warnstorf.

    Sphagnum teres, var. *subsquarrosum* Warnst. Luzerne, Sept. 12, 1894 (D. C. Eaton). Eaton & Faxon, Sphag. Bor. Am. Exs. *64*.

9. *Sphagnum recurvum* Beauv. Pool in marsh west of stone schoolhouse; E. Lake George marsh; "Mud Pond," south of Glen Lake. Determined by Dr. Andrews.

    Sphagnum recurvum, var. *amblyphyllum* Russ. Copeland Pond, "wasserform?"; marsh north of Glen Lake. Determined by Dr. Warnstorf.

    Sphagnum recurvum, var. *mucronatum* Russ. Curtis hill; pool in marsh west of stone schoolhouse. Determined by Dr. Warnstorf.

    Sphagnum recurvum, var. *tenue* H. Klinggr. Little swamp, below upper falls, N. Beaver creek, Vaughns; "Mud Pond," wetter margins, Glen Lake; bog north of Clarks Pond. Determined by Dr. Andrews. Podunk Pond marsh; southern W. Fort Ann. Determined Dr. Warnstorf as *Sphagnum parvifolium* (Sendt.) Warnst.

    Sphagnum fallax H. Klinggr. Inman Pond. Determined by Dr. Warnstorf.

    Sphagnum intermedium Hoffm. Fort Edward (Howe); Huletts Lg. (S. E. Jelliffe). Both collections are in (CH).

10. *Sphagnum subsecundum* Nees. Southern W. Fort Ann. Determined by Dr. Warnstorf. East Lake George marsh; Sugar Loaf Mt.; woods north of Cambridge. Determined by Dr. Andrews.

    Sphagnum auriculatum Schimp. Wet place, Poebles Island, mouth of Mohawk River. Determined by Dr. Andrews.

    Sphagnum contortum Schultz. Copeland Pond. Determined by Dr. Warnstorf.

    Sphagnum contortum, var. *tenue* Warnst. Five Combine woods. Determined by Dr. Warnstorf.

    Sphagnum inundatum Russ. In a small bog, Fort Edward, plants tinged with brown. (Howe). Reported in N. Y. State Cab. Rep. 20: 409. 1867, as *Sphagnum subsecundum* Nees. In the original Dr. Howe herbarium as *Sphagnum subsecundum contortum*. In the N. Y. State Herbarium as *Sphagnum inundatum* Russ.

    Sphagnum inundatum, var. *squarrosulum* Warnst. Dailey's woods, north of Hudson Falls. Determined by Dr. Warnstorf.

11. *Sphagnum fimbriatum* Wils. Old logs in wet place, woods south of Sugar Loaf Mt., southwestern W. Fort Ann. Determined by Dr. Andrews.

12. *Sphagnum Girgensohnii* Russ. Hadley, Aug., 1893 (C. A. Ingersoll). Eaton & Faxon, Sphag. Bor. Am. Exs. 2. Wet woods, Fort Edward (Howe) as *Sphagnum strictum* Lindb. South of Mud Pond, Pattens Mills; woods west of Smiths Basin; woods east of Moss St., north of Hudson Falls. Determined by Dr. Warnstorf. Shushan (Dobbin); Clemons to Black Mt.; W. Fort Ann; E. Lake George marsh; near Kingsbury St.; west of Wilburs Basin. Determined by Dr. Andrews.

13. *Sphagnum robustum* (Russ.) Röll. East of Thompsons gravel-bed. Determined by Dr. Andrews. (*Sphag. Russowii Warnst.*).

Sphagnum Russowii, var. *girgensohnoides* Russ. Clemons to Black Mt.; Rosecrans swamp. Determined by Dr. Warnstorf.

14. *Sphagnum fuscum* (Schimp.) H. Klinggr.

Sphagnum fuscum, var. *pallescens* Warnst. West of All Souls church, W. Fort Ann. Determined by Dr. Warnstorf.

Sphagnum fuscum, var. *virescens* Warnst. Rosecrans swamp. Determined by Dr. Warnstorf.

15. *Sphagnum Warnstorfii* Russ. East Lake George marsh; southern W. Fort Ann; Rosecrans swamp. Determined by Dr. Warnstorf. Hague; Cambridge waterworks swamp. Determined by Dr. Andrews. Warrensburg.

Sphagnum Warnstorfii, var. *purpurascens* Russ., f. *hydrophila*. Luzerne, Sept. 10, 1894 (C. A. Ingersoll). Eaton & Faxon, Sphag. Bor. Am. Exs. *25*.

Sphagnum Warnstorfii, var. *versicolor* Russ. East of Thompsons gravel-bed; north of Glen Lake. Determined by Dr. Warnstorf.

Sphagnum Warnstorfii, var. *viride* Russ. Hollow in field north of Scotch church, Harrisena; Hunters bridge, east of Glen Lake. Determined by Dr. Warnstorf.

16. *Sphagnum capillaceum* (Weiss) Schrank. Our most abundant species found almost everywhere that sphagnum occurs. Many collections determined by Dr. Warnstorf and Dr. Andrews. (*Sphag. acutifolium* Ehrh).

Sphagnum acutifolium, var. *rubrum* Warnst. Podunk Pond marsh. Determined by Dr. Warnstorf.

Sphagnum acutifolium, var. *versicolor* Warnst. Vaughns; Five Combine woods. Determined by Dr. Warnstorf.

Sphagnum acutifolium, var. *viride* Warnst. Dark Bay, Lake George; Fort Ann mountains. Determined by Dr. Warnstorf.

Sphagnum capillaceum, var. *tenellum* (Schimp.) A. L. Andrews. Luzerne, Sept. 11, 1894 (D. C. Eaton). Eaton & Faxon, Sphag. Bor. Am. Exs. *30* as *Sphagnum tenellum*, var. *rubellum* (Wils.) Warnst.

17. *Sphagnum quinquefarium* (Lindb.) Warnst. Crosset Pond. Determined by Dr. Warnstorf. West of Hadlock Pond; rocks north of New Michigan falls; south bank of Tripoli millpond. Determined by Dr. Andrews.

18. *Andreaea petrophila* Ehrh. Huletts Lg. (D. J. Levy).

19. *Andreaea Rothii* W. & M. Huletts Lg. (Levy); Day (C. H. Peck). (*A. rupestris* of many authors.)

20. *Georgia pellucida* (L.) Rabenh. Decaying logs and stumps; common. (*Tetraphis pellucida* of many authors).

21. *Catharinea angustata* Brid. Very common in shaded places, either in sandy or moist soil of clay or loam. (*Atrichium angustatum* B. & S.).

22. *Catharinea undulata* (L.) W. & M. Growing in similar situations as the preceding species; frequent.

23. *Polytrichum commune* L. Dry woods and old fields; abundant.

24. *Polytrichum gracile* Dicks. Blue Mt. Lake (E. G. Knight).

25. *Polytrichum juniperinum* Willd. Thin rocky soil in fields and shaded places. In Rich's swamp near Shushan, this species was found on old logs and stumps.

26. *Polytrichum Ohioense* R. & C. Huletts Lg. (Levy); decayed logs and about trees in damp woods, Fort Edward (Howe); Black Mt. and vicinity; southwest of Shushan; north of Cambridge.

27. *Polytrichum piliferum* Schreb. Sandy and thin rocky soil; common.

28. *Polytrichum Smithiae* Grout. Huletts Lg. (Levy).

29. *Polytrichum strictum* Banks. Huletts Lg. (Levy); Podunk Pond marsh; New Michigan Pond marsh.

30. *Pogonatum alpinum* (L.) Roehl.

Pogonatum alpinum, var. *arcticum* (Sw.) Brid. Moist woods and talus slopes in upland regions. Huletts Lg. (Levy), (Jelliffe); foot of Diameter precipice, South Bay, "a slender form," determined by Prof. J. W. Holzinger; W. Fort Ann.

Pogonatum alpinum, var. *septentrionale* (Sw.) Brid. Huletts Lg. (Jelliffe) in (CH) and (JH).

31. *Pogonatum brevicaule* (Brid.) Beauv. Gravelly and clayey soils and mountain woods. Huletts Lg. (Levy); Buck Mt. (G. D. Hulst); Shushan (Dobbin); Barber trail, Black Mt.; Mt. Hope road, north; north of Bacon Pond; morainal hill south of E. Lake George marsh; east of Pattens Mills.

32. *Buxbaumia aphylla* L. Fort Edward, Apr. 1868, three plants (Howe); Schuylerville (W. Greenalch), BRYOLOGIST 3: 16. July, 1900; Shushan, May 5, 1907 (Dobbin).

33. *Webera sessilis* (Schmid.) Lindb. Moist banks in exposed places and along wood roads. It is more usually met with in elevated regions and may be readily overlooked.

34. *Fissidens adiantoides* (L.) Hedw. Wet rocks and moist banks in woods, also on rocks in brooks; frequent.

Fissidens adiantoides, var. *immarginatus* Lindb. Trunks of trees, northern Washington county. Determined by Mrs. Britton.

35. *Fissidens bryoides* (L.) Hedw. Shaded rocks near streams, Fort Edward (Howe).

36. *Fissidens cristatus* Wils. Moist soil and rocks in woods, sometimes in low places; common. Dr. Howe's, Fort Edward 1866 plant in (CH) was determined by Dr. C. R. Barnes as *Fissidens decipiens* DeNot.

37. *Fissidens incurvus* Schwaegr. Charlton on stones (Peck).

Fissidens incurvus, var. *minutulus* (Sull.) Aust. Huletts Lg. (Edward Ketchell) in (CH) and (JH); Shushan on sandstone (Dobbin), determined by Mrs. Britton; Baker's ledge, S. Beaver creek, east of Vaughns, determined by Mr. Kaiser.

38. *Fissidens osmundioides* (Sw.) Hedw. Moist rocks and earth. Huletts Lg. (Levy); Shushan (Dobbin); southern New Michigan, determined by Mrs. Britton; Vaughns and vicinity.

39. *Fissidens subbasilaris* Hedw. Huletts Lg. (Jelliffe); Fort Edward, roots of trees (Howe), N. Y. State Cab. Rep. 19: 46. 1866, also in (CH).

40. *Fissidens taxifolius* (L.) Hedw. Huletts Lg. (Levy); Fort Edward, "Moreau" (Howe), N. Y. State Cab. Rep. 20: 409. 1867.

41. *Pleuridium alternifolium* (Kaulf.) Rabenh. Sandy field, DeRidder hill, east of Schuylerville (Greenalch).

42. *Pleuridium subulatum* (L.) Rabenh. Huletts Lg. (Levy); Shushan in an old field (Dobbin).

43. *Ditrichum lineare* (Sw.) Lindb. Huletts Lg. (Levy) (Jelliffe) as *Ditrichum vaginans* (Sull.) Hampe.

44. *Ditrichum pallidum* (Schreb.) Hampe. Dry soil in shaded places. Huletts Lg. (Levy); southern W. Fort Ann; Shushan.

45. *Ditrichum pusillum* (Hedw.) Timm. Huletts Lg. (Levy); Warrensburg (Peck); Shushan (Dobbin); road, northwest of Hadlock Pond, determined by Mr. Kaiser as *Ditrichum tortile* (Schrad.) Hampe.

46. *Rhabdoweisia denticulata* (Brid.) B. & S. Dresden on rocks (Peck).

47. *Oncophorus Wahlenbergii* Brid. Saratoga Co., in decaying wood (Howe) in (CH).

48. *Ceratodon purpureus* (L.) Brid. Rocks, banks, sandy barrens, old roofs; abundant and somewhat variable. Frequently seen in places overrun by recent fires.

49. *Saelania glaucescens* (Hedw.) Broth. Dresden on rocks (Peck); Fort Edward (Howe) in (SH); Shushan (Dobbin). (*Leptotrichum glaucescens* (Hedw.) Hampe.

50. *Trematodon ambiguus* (Hedw.) Hornsch. Woods, Powers Ferry to North Easton.

51. *Dicranella heteromalla* (L.) Schimp. Huletts Lg. (Levy); Shushan (Dobbin); Mt. Hope road, north; Vaughns and vicinity, in part determined by Mr. Kaiser; Wilburs Basin.

Dicranella heteromalla, var. *orthocarpa* (Hedw.) EGB. Huletts Lg. (Levy) as *Dicranella heteromalla Fitzgeraldi* (R. & C.) Grout; Lake George (Hulst); Shushan (Dobbin).

52. *Dicranella rufescens* (Dicks.) Schimp. This species "occurs as far north as Johnsburg, Warren Co." N. Y. State Mus. Rep. 24: 102. 1872, as *Dicranum rufescens* Turn.; North River (Peck); Huletts Lg. (Levy).

53. *Dicranella varia* (Hedw.) Schimp. Clay bank of stream north of Pattens Mills cemetery, determined by Mr. Kaiser; woods north of Cambridge.

54. *Dicranum Bergeri* Bland. Ballston Lake; Rich's swamp near Shushan.

55. *Dicranum Bonjeani* DeNot. Huletts Lg. (Levy); E. Lake George marsh and large marsh south of Glen Lake, determined by Mr. Kaiser.

56. *Dicranum Drummondii* CM. Huletts Lg. (Levy); Lake George (Hulst); Fred Vaughans' woods, Vaughns, clay soil under hemlocks; marshes north and south of Glen Lake. Several collections determined by Mr. Kaiser.

57. *Dicranum flagellare* Hedw. Old stumps and logs; common.

58. *Dicranum fulvum* Hook. Rocks; common.

59. *Dicranum fuscescens* Turn. Black Mt.; Anaquassacook hills, southeast of Shushan.

60. *Dicranum longifolium* Ehrh. Huletts Lg. and Cold Spring (Jelliffe) in (CH) and (JH); also (Levy); Barber trail, Black Mt.; Anaquassacook hills on rocks near Peaked Rock.

61. *Dicranum montanum* Hedw. Base of living trunks of pines and hemlocks and decaying wood. Huletts Lg. (Levy); Fort Edward (Howe) in (CH); near W. Fort Ann P. O.; vicinity of Kingsbury St.; large marsh south of Glen Lake; Anaquassacook hills.

62. *Dicranum Schisti* (Gunn.) Lindb. Huletts Lg. (Levy).

63. *Dicranum scoparium* (L.) Hedw. Earth, rocks, etc., in shaded places; abundant.

Dicranum scoparium, var. *pallidum* (C.M.) L. & J. Fort Edward (Howe) in (CH).

Dicranum scoparium, var. *paludosum* B. & S. Cool and swampy woods, W. Fort Ann. Determined in part by Mr. Kaiser. The stems of this moss are clothed with a white tomentum.

64. *Dicranum spurium* Hedw. "Sandy ground, Saratoga"(Lesquereux)in N. Y. State Cab. Rep. 19: 45. 1866; Fort Edward (Howe) in (CH).

65. *Dicranum undulatum* Ehrh. Old moist or wet woods and thin rocky soil; frequent specially in elevated regions.

66. *Dicranum viride* (S. & L.): Lindb. Huletts Lg. (Levy).

67. *Leucobryum albidum* (Brid.) Lindb. Huletts Lg. (Jelliffe); northern Washinton county growing with the next species, determined by Mrs. Britton.

68. *Leucobryum glaucum* (L.) Schimp. A conspicuous and common moss forming compact light-colored cushions in moist or dry shaded places, mossy coniferous woods and borders of swamps.

69. *Hedwigia albicans* (Web.) Lindb. Rocks and boulders; abundant. (*Hedwigia ciliata* Ehrh.).

Hedwigia albicans, var. *leucophaea* (B. & S.) Limpr. Huletts Lg. (Jelliffe).

Hedwigia albicans, var. *secunda* (B. & S.) Limpr. Huletts Lg. (Jelliffe), (Levy).

Hedwigia albicans, var. *viridis* (B. & S.) Limpr. Huletts Lg. (Jelliffe).

70. *Grimmia apocarpa* (L.) Hedw. Dry or moist rocks. Huletts Lg. (Levy); Shushan (Dobbin); road near Wiggins iron mine, W. Fort Ann and vicinity of Vaughns, determined by Mr. Kaiser. The sterile Luzerne plants (G. W. Clinton) known as *Schistidium Agassizii* Sull. & Lesq., reported in N. Y. State Cab. Rep. 20: 405. 1867, were compared by Dr. Peck, June 23, 1902, with specimens of *S. Agassizii* from Lake Superior in the Sullivant and Lesquereux exsiccati. Dr. Peck says, "while it approaches that species closely in its small size and costa ceasing below the apex of the leaves, I conclude from the shape of the leaves that it is rather a form of *S. apocarpum.*"

(*To be Continued*)

HINTS FOR LICHEN STUDIES

Albert C. Herre

There are apparently very few people in this country actively engaged in the study of lichens. Just why this should be so is rather difficult to see, since many lichens are quite conspicuous, either from their size, color, or numbers. Perhaps the greatest obstacle has been the difficulty experienced by the isolated amateur in finding out their names, whereas the numerous manuals of flowering plants readily afford one an easy introduction to the higher plants.

In this country we have perhaps neglected most the study of the physiological activities of lichens. We know relatively little concerning the rate of growth of these organisms, and the causes which may make a given species grow to a much greater size in one region than it does in another. My personal belief, based upon observations of lichens over the region lying between Canada and Mexico, Great Salt Lake and the Pacific, is that actual amount of rainfall is only a minor factor, since *Ramalina reticulata*, easily the largest of North American lichens, reaches its maximum growth with a rainfall of but 16 to 20 inches. A greatly prolonged growing season, high atmospheric humidity but not necessarily much rainfall, and an undisturbed substratum, are probably the three most important growth conditions for lichens. It is such conditions which make possible the almost incredible length which the fibers of *Usnea longissima* attain in the mountains of Java, and the coast range of Oregon.

There is room for a thousand enthusiastic nature lovers scattered over the country to take observations for a series of years upon the increase in diameter of the thallus of our common bark- and rock-dwelling lichens. The exposure upon which growth first appears and is most rapid, the growth in sun and shade, as affected by prevailing winds, or other evident variable conditions, are all things which could be profitably recorded, and after sufficient material had been obtained the results should be collated and published.

The way in which heredity is transmitted in lichens is a field which should be investigated. As suggested by me on other occasions, Mendelian inheritance as exemplified in most organisms is an impossibility. Under the means by which lichens are usually propagated no sexual reproduction with its complex of chromosome division is involved. Lichens are in general asexually reproduced, but